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ABSTRACT

In spring 1990, a study was conducted of students in six Psychology classes taught by three instructors at Rancho Santiago College (RSC) to assess the impact of reading ability on exam performance. Students who volunteered for the study were administered the Nelson-Denny reading test. Those scoring below the 10th grade level were designated as "low-skill readers," while those scoring above the 10th grade level were considered "high-skill readers." Student demographic data and information on employment and enrollment status were also obtained. Class performance was measured by the scores received on the major exams given during the semester, and outcomes were assessed separately for the three instructors. Study findings included the following: (1) 73% of the 120 students identified as high-skill readers and 64% of the 55 low-skill readers persisted to the end of the semester; (2) no relationship was found between exam performance and students' gender, hours worked, or returning versus new student status; (3) on the first of four exams of the semester, the better readers scored about 12% higher than the low-level readers; (4) by the last exam of the semester, the high-level readers scored 7% to 8% higher than the low-level readers; and (5) while the instructors used the same textbooks and exams, the "reading factor" did not influence performance consistently across instructors, though better readers performed better on tests than the poorer readers regardless of instructor. (PAA)

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The Impact of Reading Ability on Classroom Performance

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August, 1990

JC 920 050

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Abstract

Students in six Psychology classes (taught by three instructors) participated in a study designed to assess the impact of reading ability and exam performance. To control for teaching style, grading differences, etc., classes were grouped together for each instructor. Then, comparisons were made for a given instructor's "set" of classes.

Students who scored below the 10th grade level on the Nelson-Denny reading test were defined as "low" readers. Those scoring above this grade level were designated as "high" readers. After each major exam, a comparison of exam performance to reading level was made. At the beginning of the semester, 120 students were in the high group and 55 in the low. By semester's end 87 high readers were active and 35 in the low group remained enrolled. While the results varied for each instructor, reading ability was shown to be significantly related to test performance. On the average, the high reading group out-performed the low group by seven to twelve percentage points on each major exam. While test scores improved over the semester for both groups, the low readers never bridged this performance gap. Also, the persistence rates for the high readers was 73% while it was 64% for the low group.

Introduction

There have been many recent studies which have examined the relationship between reading ability and final course grades. But generally, the findings have been disappointing. In a literature review by Davis (1985), reading ability only accounts for 10% of how a student performs in a course. Similarly, our own investigations at RSC have shown only modest correlations between reading test scores and final grades (e.g., Kessler, 1987).

The frustrating part of these results is that we, as faculty and administrators, know that students who can well comprehend written material have an obvious advantage over those who struggle. But how do we measure it? With these frustrations in mind, the RSC Research Committee decided to try a different methodology. The purpose of this study was to find out how students of various reading levels perform **during** a given course, as opposed to the end of a semester.

Design and Procedure

At the beginning of the Spring semester 1990, students in six Psychology classes, one Marketing class, two Biology classes, and one Economics class were identified for study. Instructors were invited to participate if they taught classes with enrollment of at least 25 students.

On the second day of class, students in the classes were asked to volunteer for the study. They were administered the Nelson-Denny Reading Test (Nelson & Denny, 1973; Form C) by experienced RSC counseling staff.

Students also completed a questionnaire designed to gather basic demographic information including their age, hours worked each week, and whether they were a new or returning student. Instructors were not given any feedback during the semester about any of the student's scores or answers to the questionnaire. Students could find out their results from the research office during the last week in the semester.

Students were grouped into two categories of reading ability based upon their composite reading score. Scores on the Nelson-Denny are derived by summing the vocabulary section with twice the comprehension section (Vocab+[2*Comprehension]). Students who scored below the 10th grade level (a score of 47 or less) were identified as the "low" group and those above this cut-off were the "high" group. Since the RSC course catalog recommends a 10th grade reading level for transfer level courses, we felt these cut-off scores were appropriate.

Classroom performance was measured by the scores students attained on the major exams during the semester. In this way, we could evaluate how the two groups

performed on each test instead of averaging across the entire year. We also wanted to avoid measuring actual grades received because of the inconsistency in what each letter grade represents to different instructors across many courses. Instructors, therefore, provided the test scores in terms of percentage correct.

Because there were not enough students in the Marketing, Biology, and Economics courses to make a reliable comparison, only those students in Introductory Psychology courses were included in the final sample. In this group, there were three instructors and six classes. Each course taught by a given instructor was combined. By not combining courses taught by different instructors, we can control for different teaching styles, etc.

To summarize then, students in six Psychology classes (taught by three instructors) were evaluated by the reading test. After each major exam, a comparison of performance was made. Students who took a test were included **even if they were not in class for the next exam**. Consequently, the number of students compared will vary with the drop rate of the class. For example, at the beginning of the semester, 120 students were in the high group and 55 in the low. By semester's end, 87 high readers were active and 35 in the low group remained enrolled. The persistence rate for the high readers was 73% while it was 64% for the low group.

Results

In order to rule out confounding effects, a series of multivariate analyses of variance (MANOVA) were computed. The results indicated no effects of sex, hours worked, or a sex by hours worked interaction (all F's < 1) for any of the exams in any of the instructor's classes. Therefore, the differences in test scores cannot be attributed to the students' gender or how much they worked during the semester.

By way of simplification, each of the three instructor's classes sampled will be presented separately as instructor "A", "B", & "C". A composite of all the classes will be presented at the end of this section.

Instructor "A"

Instructor "A" taught three sections of Psychology 100 and each class was given four major exams during the semester. These exams were comprised of essay type questions. All three classes have been combined in the following analysis.

From Table 1 it can be seen that the students in the high reading group **significantly** out-performed the low group on three of the four exams. The range of scores (standard deviations) did not differ significantly which indicates that the distribution of scores was equivalent for each group.

Table 1
Comparison of Low and High Reading Groups[1]
Across Four Exams: Instructor "A"

Variable		N	Mean Score[2]	Standard Deviation[2]	T-Test
Test 1	High Group	70	54.5	23.14	3.07**
	Low Group	26	38.1	23.16	
Test 2	High Group	62	50.6	20.3	2.16*
	Low Group	16	35.2	26.5	
Test 3	High Group	50	53.7	19.8	1.65ns
	Low Group	11	43.2	18.7	
Test 4	High Group	50	50.9	15.2	2.94**
	Low Group	12	34.9	17.3	

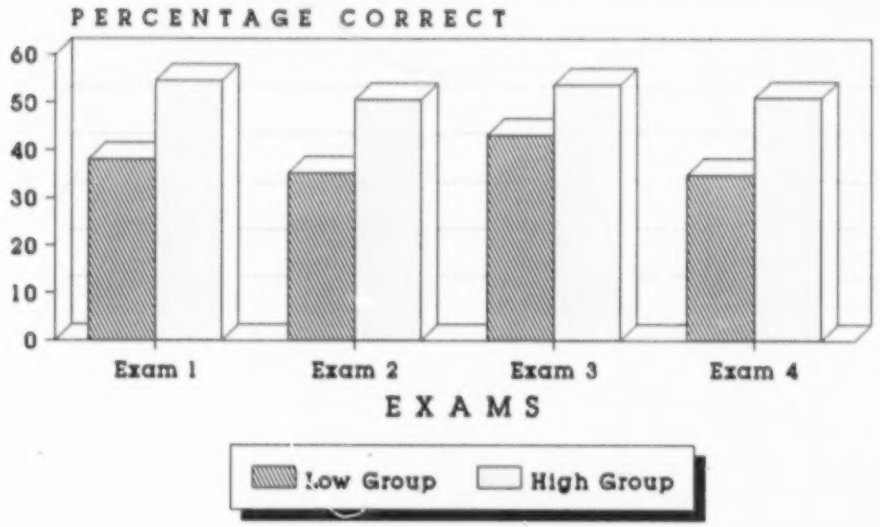
[1] Low<10th grade level, High≥10th grade level, Nelson-Denny
[2] Test scores expressed as percentages
* $p<.05$
** $p<.01$

Notice that the persistence rates for the high reading group surpassed the low readers (71% vs. 46%). Only on the third exam did the two groups show equivalence.

Presented graphically in Figure 1, the discrepancy in the test scores varied between 10 to 16 percentage points. On most exams, this much difference is at least one letter grade higher for the better readers.

Figure 1

Test Performance for Low & High Readers in Psychology 100 with Instructor "A"



Instructor "B"

Instructor "B" taught two sections of psychology and each class took five exams. These exams were also of an essay nature. The results of the two combined classes is outlined in Table 2. For this instructor, the high readers showed a 72% persistence rate as compared to 44% for low readers. As with the previous instructor outlined above, the distribution of exam scores was also equivalent for each group. However, the two groups of readers only showed **significantly** different scores on exams 2 & 3.

Table 2
Comparison of Low and High Reading Groups[1]
Across Four Exams: Instructor "B"

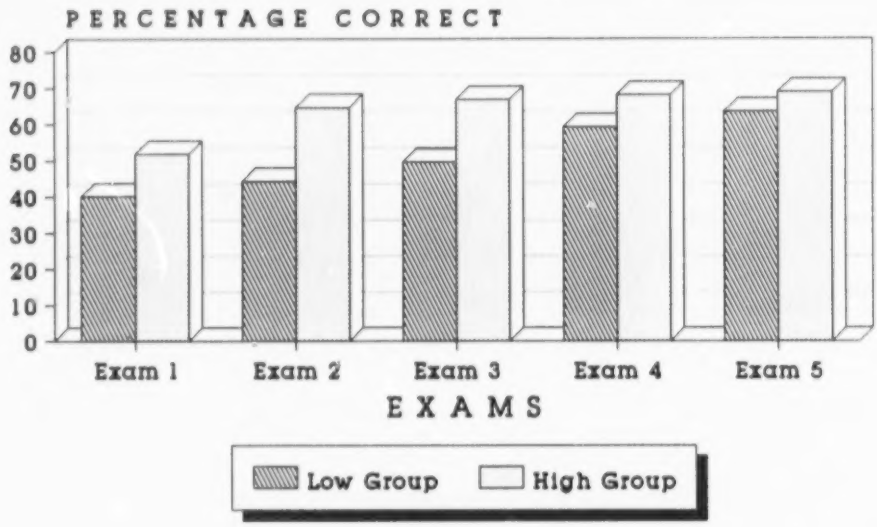
Variable		N	Mean Score[2]	Standard Deviation[2]	T-Test
Test 1	High Group	32	51.8	21.3	1.95ns
	Low Group	11	40.1	19.7	
Test 2	High Group	26	64.7	15.7	3.44**
	Low Group	16	44.3	20.3	
Test 3	High Group	28	66.8	15.7	2.73**
	Low Group	16	49.2	22.2	
Test 4	High Group	21	68.9	16.8	1.36ns
	Low Group	13	59.2	19.4	
Test 5	High Group	23	68.9	16.1	.89ns
	Low Group	8	63.5	14.3	

[1] Low<10th grade level, High≥10th grade level, Nelson-Denny
[2] Test scores expressed as percentages
** $p<.01$

When reviewed graphically (Figure 2), you can see how the overall scores for each group increased during the semester. By the end of the class, the low group had an increase in the mean score of 23 percentage points and the high group improved about 18 percentage points. Of course, we have to attribute some of those gains to the fact that over 50% of the original group dropped before the final exam. But it should be noted that this marked upward trend for both groups did not present itself in any of the other instructor's classes which were sampled.

Figure 2

Test Performance for Low & High Readers in Psychology 100 with Instructor "B"



Instructor "C"

Instructor "C" taught one section of Psychology 100 and the class took four exams. These, like the others in the department were of an essay nature. For this instructor, the high readers showed a 91% persistence rate as compared to 89% for low readers. The small discrepancy in persistence could be due in part to the smaller enrollment. As with the previous instructors outlined above, the distribution of exam scores was also equivalent for each group. Unlike the previous instructors, however, the two groups of readers did not show **significant** differences on any of the exams.

Table 3
Comparison of Low and High Reading Groups[1]
Across Four Exams: Instructor "C"

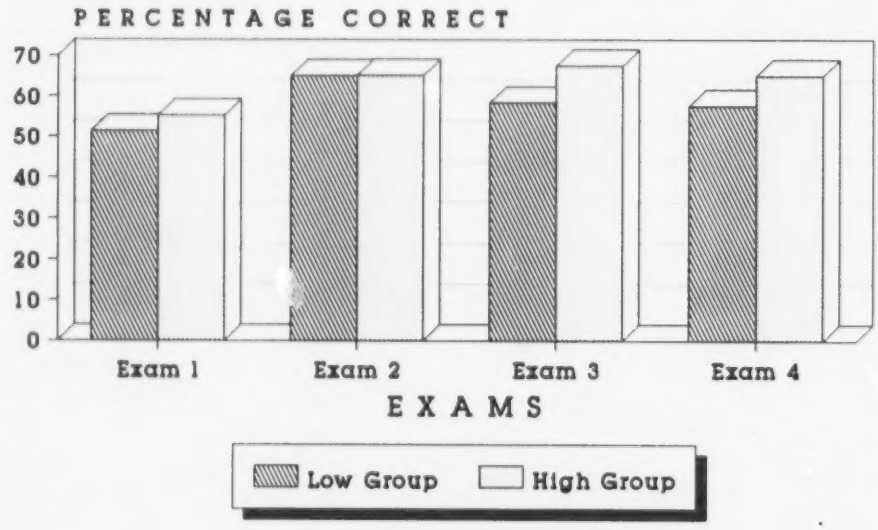
Variable		N	Mean Score[2]	Standard Deviation[2]	T-Test
Test 1	High Group	18	55.3	16.9	<1
	Low Group	11	51.4	17.1	
Test 2	High Group	17	65.2	17.8	<1
	Low Group	10	65.1	11.9	
Test 3	High Group	16	67.5	15.3	1.49ns
	Low Group	10	58.4	15.0	
Test 4	High Group	16	65.0	13.4	1.19ns
	Low Group	10	57.6	16.5	

[1] Low<10th grade level, High≥10th grade level, Nelson-Denny
[2] Test scores expressed as percentages

In Figure 3, you can see how the overall scores for each group increased slightly during the semester. By the end of the class, the low group had an increase in the mean score of three percentage points and the high group improved about ten percentage points.

Figure 3

Test Performance for Low & High Readers in Psychology 100 with Instructor "C"



Comparison of All Psychology Classes

Even though we wanted to control for the differences in instructional style, grading criteria, and so on, we also wanted to see what the combined course data indicated. Because one instructor gave five exams and the others only four, the following results are based on the first four exams. **The high group significantly out-performed the low group on three of the four exams.**

Over the semester, the low group had an increase of nine percentage points and the high group increased about four percentage points, representing a modest improvement for both groups over time (Figure 4).

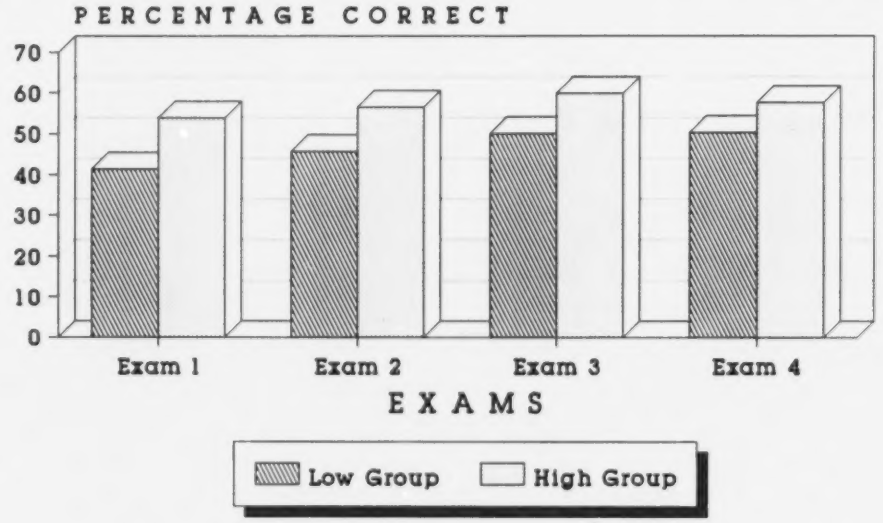
Table 4
Comparison of Low and High Reading Groups[1]
For All Psychology Students Sampled

Variable		N	Mean Score[2]	Standard Deviation[2]	T-Test
Test 1	High Group	120	53.9	21.7	3.57***
	Low Group	55	41.4	21.2	
Test 2	High Group	105	56.5	20.0	2.55**
	Low Group	42	45.8	23.9	
Test 3	High Group	94	59.9	19.0	2.59**
	Low Group	37	50.1	19.8	
Test 4	High Group	87	57.6	17.1	1.83ns
	Low Group	35	50.4	20.8	

[1] Low<10th grade level, High≥10th grade level, Nelson-Denny
[2] Test scores expressed as percentages
** p<.01
*** p<.001

Figure 4

Test Performance for Low & High Readers For All Psychology 100 Students Sampled



Discussion

Overall, the results of this investigation support the hypothesis that reading ability does indeed affect classroom performance on exams. Because the exams given to students in the sample were all essay, reading ability was not the only factor at play. However, the findings suggest that if we are to really understand how variables like reading affect performance, we need to look at the effects over time and not simply evaluate using a final grade.

Contrary to expectations, the amount of time students worked did not affect their exam grades. Men and women performed equally well on the exams, and returning students did no better than new students in the classes sampled.

It would appear that one's ability to read at the 10th grade level or better really is an advantage in Introduction to Psychology. On the first exam in the semester the better readers received about twelve percentage points higher (Table 4). By the end of the semester the high group still maintained a seven to eight percentage point advantage. If grading is based on the traditional 90%= A, 80%= B, etc., the reading factor is significant. As students drop over the course of the year (for a myriad of reasons) the number of poor readers declines at a greater rate than those with better skills.

Finally, it is no surprise that the "reading factor" did not influence performance consistently across instructors. Even though the textbooks used were identical and the multiple-choice chapter exams given were identical (taken at the student's pace in the learning center), classroom success was not. In each class, the better readers did

show advantages. But in some classes the advantage was small and in others quite pronounced. It is safe to say that students should know that their chances for improved performance are significantly linked to their ability to read.

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